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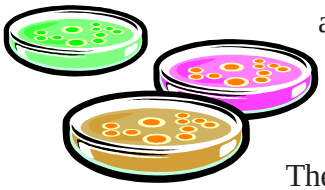
New strategies for fighting bacteria

The introduction of antibiotics to the doctor's medicine bag was a milestone in the war on infectious microorganisms. The first antibiotic to be widely available was penicillin. This product of the soil mold *Penicillium*, is useful in treating many disease-causing bacteria. But just four years after drug companies began mass-producing penicillin in 1943, microbes began to appear that could resist the antimicrobial wonder. Antibiotic resistance has continued to develop since. The Center for Disease Control reported that in 1992, 13,300 hospital patients died of bacterial infections that were resistant to antibiotic treatment.

Microbes are able to counteract antibiotics by interfering with their mechanism of action. For example, penicillin kills bacteria by attaching to microbe cell walls and then destroying a part of the wall. The broken wall falls apart and the bacterium dies. Resistant microbes have either altered their cell walls so penicillin can't bind or they produce enzymes that dismantle the antibiotic.



Emerging Alternatives in human medicine:

Antibiotic resistance is inevitable, say scientists, but there are measures we can take to slow its development. Efforts are under way on several fronts – improving infection control, using drugs more appropriately, and developing new antibiotics. Many antibiotics, such as penicillin, are products of microbes. Some new alternatives may come from other sources in the future.

* Oil from the common herb oregano may be an effective treatment against dangerous, and sometimes drug-resistant bacteria. Two studies have shown that oregano oil, in particular the carvacrol component, appears to reduce infection as effectively as traditional antibiotics.

* Researchers have shown that a natural enzyme derived from viruses that live inside bacteria can successfully target and kill disease bacteria, including those resistant to drugs.

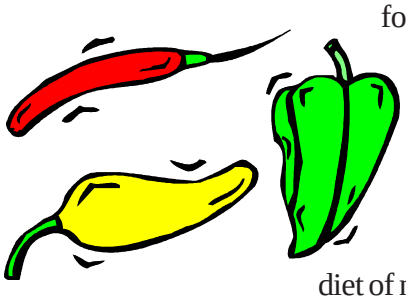
* A new antibiotic may be developed from research involving fish. A new peptide antibiotic named piscidin was isolated from mast cells of hybrid striped bass. The piscidins have the potential to fight important bacterial pathogens of both fish and mammals, including bacteria resistant to multiple drugs.

Bacteria in our food:

Ninety per cent of all food-borne illness is a result of microbial contamination of food that has occurred somewhere during processing, distribution, or preparation. The remaining ten per cent is usually the result of chemical contamination or allergic reaction. Of the microorganisms implicated in food-borne disease, it is bacteria that are the primary culprits, often *E. coli*, *Salmonella*, *Listeria*, *Campylobacter*, *Staphylococcus*, and other food-borne microbes.

A common concern with consumers is bacteria in meat products. *Salmonella* and *Campylobacter* are not uncommon in poultry products and *E. coli* is often found

in ground beef. The producers and processing industry take precautions to limit and prevent contamination of food products, but it can happen. Consumers must be responsible in food handling and preparation to limit cross-contamination and ensure foods are properly prepared and cooked.



Several new methods may soon be available for control of bacteria causing food poisoning in chickens. The chemical that gives peppers their bite, capsaicin, may one day be added to the diet of neonatal broiler chicks to increase their resistance to *Salmonella*. Research indicates that capsaicin increases resistance to the *Salmonella* without adversely affecting feed consumption, weight gain, or the taste of the chicken when cooked.

Trees may provide another new anti-bacterial control. An extract from the larch tree has been shown to suppress the growth of *Salmonella* in chicken and *E. coli* in meat. The near colourless and flavourless extract can slow growth of *Salmonella* on chicken meat rinsed with a 5% solution. Similar experiments with fresh beef demonstrated that the extract suppresses the growth of *E. coli* by 30 – 70%. Plans are in the works for a dipping solution for use in meat and poultry processing plants and a home preparation for cleaning sinks and countertops may be developed as well.

Dried plum mixtures possess antimicrobial properties than can help make meat products safer. The effects of dried plum mixtures have been tested on ground meat that was contaminated with common food-borne pathogens. Research indicates that as little as Three per cent of plum extract mixed with raw meats is over 90% effective in suppressing the growth of major food-borne pathogens such as *E. coli* O157:H7, *Salmonella*, *Listeria*, *Y. enterocolitica* and *Staphylococcus*. The plum extract does not flavour the meat, so the food tastes normal.

Food Preparation Tidbit:

At room temperature (20°C) *E. coli* O157 can survive on stainless steel for 34 days, on brass for four days and on copper for just four hours!

For more information:

Health Canada site on "Hamburger Disease":
http://www.hc-sc.gc.ca/english/feature/summer/food_drink/bbq.html

Hot pepper oil may prevent *Salmonella* in poultry:
http://www.research.vt.edu/resmag/sciencecol/2002hotchick.html

Larch-tree extract that protects food from disease-causing bacteria:
http://www.umt.edu/urelations/rview/fall2001/bacteria.htm

Plum controls pathogens in meat:
http://www.mediarelations.ksu.edu/WEB/News/NewsReleases/plums11002.html

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